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I, JULIE BILLINGSLEY, TEAM LEADER EXAMINATION SUPPORT AND SALES hereby certify that annexed is a true copy of the Provisional specification in connection with Application No. 2003900506 for a patent by PAUL F. CURTIS, ROBERT A. CURTIS and ROSS W. DELANEY as filed on 05 February 2003.

WITNESS my hand this  
Ninth day of February 2004

A handwritten signature in cursive script, appearing to read "J. Billingsley".

JULIE BILLINGSLEY  
TEAM LEADER EXAMINATION  
SUPPORT AND SALES



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**Provisional Specification.**

**Title: Heat and Power Solar Tiles**

**Field of Invention**

This invention relates to a solar collector device, which is able to generate hot  
5 air, hot water and electricity from one roof integrated solar array.

**Background to the Invention**

Solar hot air, solar hot water and photovoltaic (electricity generating)  
collectors have all served a useful purpose as separate types of solar energy  
collectors for many years.

10 To generate hot air, hot water and electricity from the sun a building owner  
has needed to install three different types of solar collectors all looking quite  
different and being sold and installed by different suppliers.

Furthermore, seldom have these collectors been integrated with (forming part  
of) the roof. This has resulted in an untidy look, inefficiencies in  
15 performance, unnecessary costs, and complexity in installation.

**Brief Summary of the Invention**

This invention brings the three types of solar collector, hot air, hot water and  
photovoltaic into one modularised roof-integrated collector system.

Key elements in the invention are: .

- 20     A.     A method of integrating solar hot air, solar hot water, and photovoltaic  
              (PV) collection into one modular array
- B.     A method of joining the separate modules into an array while at the  
                  same time ensuring that they are weather resistant and can function as  
                  an effective roof cladding.
- 25     C.     A method of joining the separate modules into an array so that an  
                  airtight duct is formed between the modules as they are installed.
- D.     A system to allow one standard module to be modified on site to  
                  enable airflow to be directed through the module in any one or two of  
                  four directions. (up, down, left or right)
- 30     E.     A mechanism which positively and accurately locates the modules in  
                  relation to each other.
- F.     A method of installing pipes through the array of modules to take  
                  water or other fluid for the purpose of heating that water or fluid.

The invention may operate with or without the hot water option, with  
35     or without the photovoltaic option, and with or without the hot air option.

Brief Description of Drawings

The accompanying drawings illustrate an embodiment of the solar module  
according to the invention.

Figure 1 is a view of a single module in its assembled state. Figures 2 and 3  
40     are side and end views

Detailed Description of the Invention with Reference to the Drawings

Preferably the solar tile modules comprise the following desirable features.

- A. A method of integrating solar hot air, solar hot water, and photovoltaic collection into one modular array.
- 45 Ideally this is done by utilising a Photovoltaic panel (Figure 1, item 1) as the module glazing. Where Photovoltaic (PV) panels are not required, as in the case of a thermal only panel, then a clear glazing panel backed with an absorber plate, (Figure 2, item 2) ideally with a sealed air space between, is located in the place of the Photovoltaic panel, and as described below and in Figures 1 – 3.
- 50 The air being heated then flows directly behind the PV or absorber plate, while also making provision for liquid heating tubes (Figure 2, item 3) to pass through the module.
- B. A method of joining the separate modules into an array, so that they are weather resistant and can function as an effective roof cladding.
- 55 The array sheds rainwater down the slope of the roof by arranging the PV panel or the clear glazing to overlap the PV panel or the clear glazing of the module down slope, in tile fashion. (Figure 3, item 8) The array is weather resistant across the roof, by a lip (Figure 2, item 4) on one module being arranged to mate with a cap (Figure 2, item 5) on the adjacent side of the

60 adjoining module. See Figure 2. To prevent water penetration into the building in case of the glazing being broken, the continuous surface behind the glazing is extended in order to overlap the module below.

C. A method of joining the separate modules into an array so that an airtight duct is formed between the modules as they are installed.

65 This is achieved by an arrangement to mate adjacent sides of adjoining modules, so that when modules are fixed down to the roof, an airtight duct is formed between the modules, for example by sloping the sides and ends of the modules (Figure 3, item 6) and forming an opening (Figure 3, item 7) lined with a sealing bead or strip, on each of the four sides, so that when the  
70 adjoining module is fixed down to the roof battens it automatically places pressure on the sealing bead or strip and forms an airtight duct. Openings in the modules, which are not required ie, at the side of an array, may be closed off, by for example the use of a capping plate or by not removing a knock out panel before the module is installed.

75 D. A system to allow one standard module to be modified on site to enable airflow to be directed through the module in any one or two of four directions, up, down, left or right.

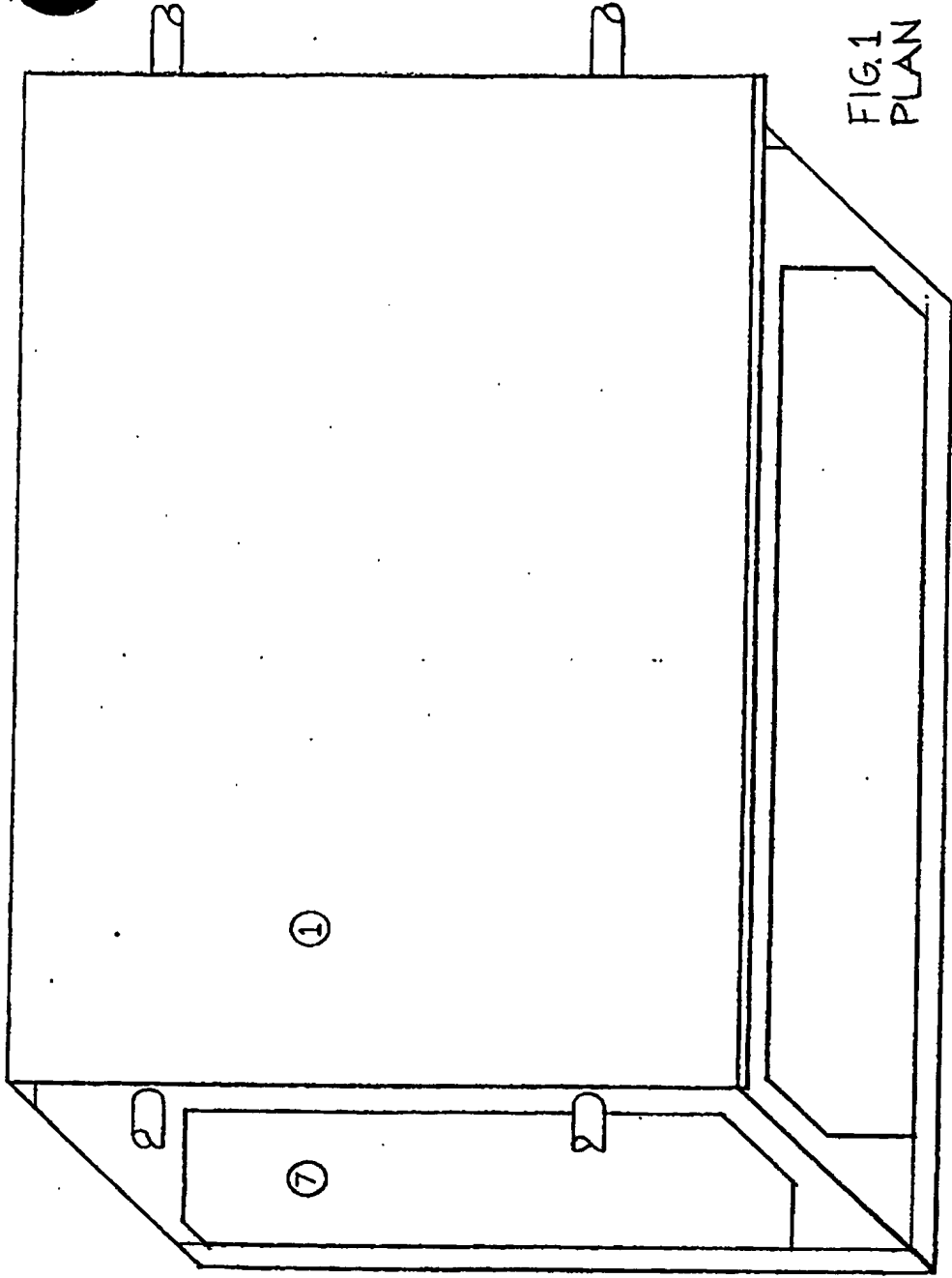
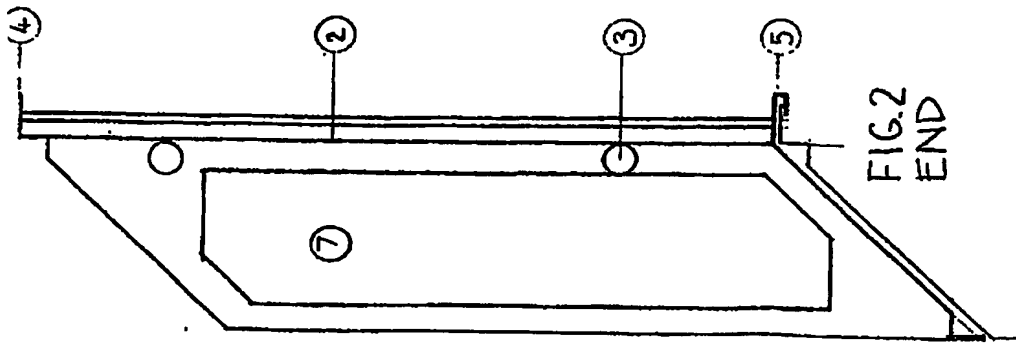
Openings are available in all four sides of the standard module. Any opening not required for that module is closed, by for example by attaching a capping  
80 plate or similar devise or not removing a knockout panel.

E. A mechanism which positively and accurately locates the modules and places pressure on the sealing strip between modules.

A peg and tapered slot arrangement for example or other mechanism, which guides the module into its correct position, may achieve this thereby  
85 placing pressure on the sealing strip between the modules..

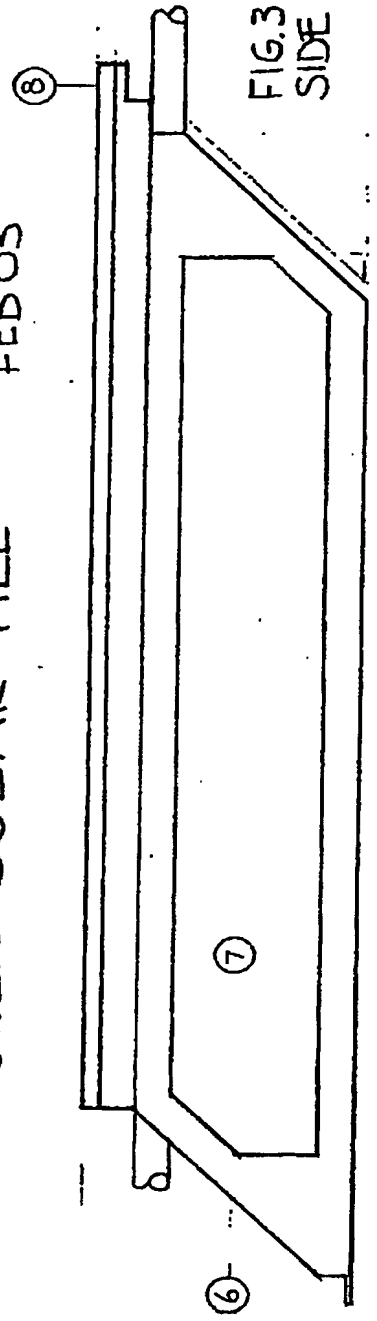
F. A method of inserting pipes through the array of modules to take water or other fluid for the purpose of heating water, or other fluid.

U shaped pipe guides are attached to the back surface of the absorber plate. After all the modules are fixed in place, the heating pipes are inserted through  
90 the pipe guides and attached to top and bottom manifolds. A capping plate or similar devise is used to close off the air duct at the top and bottom of the array where the heating pipes penetrate. (Figure 2, item 3)



# HEAT AND POWER SOLAR TILE

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